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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,905	10/14/2003	Masayuki Tobita	14157-013001	6270
26161	7590	03/03/2006	EXAMINER	
FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			SELLERS, ROBERT E	
			ART UNIT	PAPER NUMBER
			1712	

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/685,905	<b>Applicant(s)</b> TOBITA ET AL.	
	<b>Examiner</b> Robert Sellers	<b>Art Unit</b> 1712	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 December 2005 and 25 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 5,6 and 8-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/14/03 &amp; 3/15/04</u> | 6) <input type="checkbox"/> Other: _____  |

Claims 5, 6 and 8-12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on December 5, 2005.

1. There is no identification of the acronym "LSI" on page 1, line 14 of the specification.
2. Japanese Patent No. 6-51778 listed in the Information Disclosure Statement, Form PTO-1449 filed October 14, 2003 has not been provided. A search for the patent number revealed a Japanese patent with non-related subject matter and a different publication date.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. It is unclear how the epoxy resin is cured to obtain the molded article in the absence of a defined curing agent. Each of Examples 1-5 on pages 20-22 uses a curing agent to mold and cure the composition. More favorable consideration would be given to inclusion of the phrase "and a curing agent" after the term "epoxy resin" in claim 1, line 3.

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4. Contingent upon the insertion of the suggested claim language, the following election of species requirement is advanced:

This application contains claims directed to the following patentably distinct species: The curing agents such as the 4,4'-diamino-1,2-diphenylethane utilized in Examples 1-5.

The species are independent or distinct because the myriad species of curing agents listed on page 6, line 30 to page 8, line 28 requires multiples searches within classes 523 and 525.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Claims 1-4 and 7 would be generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species.

MPEP § 809.02(a).

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The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4 and 7 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 copending application no. 10/832,947 as represented by U.S. Publication No. 2004/0224163. Although the conflicting claims are not identical, they are not patentably distinct from each other.

5. The claims of the copending application define a thermally-conductive epoxy resin molded article having a thermal conductivity of from 0.5 to 30 W/m-K comprising an azomethine group-containing epoxy resin (a suitable species of epoxy resin according to page 5, line 15 of the instant specification) wherein the the molecular chains of the epoxy resin are oriented in a specific direction (claim 2). The orientation is conducted with a magnetic field (page 4, paragraphs 40 and 41), thereby inherently resulting in a degree of orientation  $\alpha$  within the claimed boundaries.

6. Although the thermally-conductive filler of claim 7 is not recited, it would have been obvious to add a thermally conductive filler in order to optimize the thermal conductivity, especially considering the claims of the copending application are open to their inclusion as specified on pages 3-4, paragraphs 33 and 34.

Claims 1-4 and 7 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 6,652,958 (Tobita) in view of the CAPLUS accession no. 1992:512648 article by Barclay et al. and the CAPLUS accession no. 1997:755474 article by Douglas et al.

Although the conflicting claims are not identical, they are not patentably distinct from each other.

7. The claims of Tobita denote a thermally conductive polymer sheet composed of a polymer matrix and graphitized carbon fibers oriented perpendicular to the sheet. Graphitized carbon fiber is within the realm of the thermally-conductive filler of claim 7 as corroborated by page 9, line 25 of the instant specification.

An epoxy resin is a suitable polymer matrix according to column 15, lines 50-51 and column 16, Table 5, Example 6. The composition in a mold was exposed to a magnetic field as shown in column 15, lines 60-66 followed by hardening (col. 16, lines 1-3).

8. According to page 13, lines 3-15, the claimed degree of orientation  $\alpha$  is caused by the application of a magnetic field to composition during molding and before curing. Page 5, lines 9-12 describes a liquid crystalline epoxy resin having at least one mesogenic group has the capacity for easy orientation.

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9. Tobita shows an epoxy resin without indicating whether it is liquid crystalline.

Barclay et al. sets forth the influence of a magnetic field during the curing of liquid crystalline epoxy networks such as the dihydroxymethylstilbene epoxy resin utilized in Example 4 on page 21, line 26 of the instant specification (CAPLUS abstract, third IT).

Douglas et al. reports the alignment of liquid crystalline dihydroxy- $\alpha$ -methylstilbene diglycidyl ether cured with sulfanilamide in a magnetic field.

10. It would have been obvious to employ the liquid crystalline epoxy resin of Barclay et al. and Douglas et al. as the epoxy resin of Tobita in order to increase the magnetic energy and dissipate the thermal energy (Douglas et al., AB, lines 4-5).

Once a magnetic field is applied to the composition, the epoxy resin as well as the graphitized fibers are susceptible to orientation. Therefore, the epoxy resin composition of Tobita in view of Barclay et al. and Douglas et al. inherently exhibits a degree of orientation  $\alpha$  within the claimed parameters based on its exposure to a magnetic field during molding and prior to hardening.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobita Patent No. 6,652,958 and Tobita et al. Publication No. 2003/0194544 in view of Barclay et al. and Douglas et al.

11. Tobita is described hereinabove. Tobita et al. (page 5, paragraph 71, Example 3) shows the treatment of a formulation containing a liquid epoxy resin, carbon fibers and boron nitride powder to a magnetic field formed into a sheet and then cured.

12. Tobita (et al.) shows an epoxy resin without indicating whether it is liquid crystalline. Barclay et al. and Douglas et al. are described hereinabove.

13. It would have been obvious to employ the liquid crystalline epoxy resin of Barclay et al. and Douglas et al. as the epoxy resin of Tobita (et al.) in order to increase the magnetic energy and dissipate the thermal energy (Douglas et al., AB, lines 4-5). Once a magnetic field is applied to the composition, the epoxy resin as well as the carbon fibers are susceptible to orientation. Therefore, the epoxy resin composition of Tobita (et al.) in view of Barclay et al. and Douglas et al. inherently exhibits a degree of orientation  $\alpha$  within the claimed parameters based on its exposure to a magnetic field during molding and prior to hardening.



14. The effective filing date for Tobita et al. Publication No. 2003/0194544 is April 9, 2003 which can be antedated with a certified English translation for Japanese priority no. 2002-343822 having a date of November 27, 2002 as long as the subject matter contained therein supports the claimed limitations.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Earls et al. Patent No. 5,391,651 and Hefner, Jr. et al. Patent No. 5,266,660.

15. Earls (col. 2, lines 19-22; col. 31, lines 33-55; col. 32, lines 42-47 and col. 33, lines 48-49) and Hefner, Jr. et al. (col. 1, lines 58-67; col. 43, line 48 to col. 44, line 3; col. 44, lines 63-68 and col. 46, lines 1-2) espouse blends of mesogenic epoxy resins with curing agents and inorganic oxide fillers wherein during processing into a part, the blend is subjected to a magnetic field to orient the liquid crystal moieties for improving the mechanical properties.

16. Although the exposure to a magnetic field is disclosed but not exemplified, it would have been obvious to subject the mesogenic epoxy resin blends to a magnetic field in order to enhance the mechanical properties. The so treated blend would inherently possess a degree of orientation  $\alpha$  within the claimed limits.

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al., Douglas et al., the CAPLUS accession no. 1992:84784 article by Ober et al. and the Journal of Polymer Science articles by Ribera et al., Castell et al. and Harada et al.

17. Barclay et al. and Douglas et al. are described hereinabove.

18. Ober et al. describes liquid crystalline epoxy networks prepared from glycidyl-terminated polyether oligomers oriented during curing in a magnetic field. Ribera et al. (page 3923, second column last paragraph), Castell et al. (page 10, second column, the "Macroscopic Orientation of the LCTs" section) and Harada et al. (page 1740, Table 1 and the first column, the "Thermal Conductivity of the DGETAM/DDE System" section, lines 10-14) discuss the treatment of curable liquid crystalline epoxy resins with a magnetic field. Harada et al. exhibits a thermal conductivity of 0.89 W/m-K.

19. Although the magnetically oriented, cured compositions of the references are not indicated as being formed into the claimed molded article, it would have been obvious to incorporate the prior art compositions into a mold prior to exposure to a magnetic field and curing in order to form a molded article. The magnetic field-treated cured products of Barclay et al., Douglas et al., Ober et al., Ribera et al., Castell et al. and Harada et al. submitted to a magnetic field inherently exhibits a degree of orientation  $\alpha$  within the claimed parameters.

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20. The publication date for Castell et al. is January 3, 2003 (see CAPLUS accession no. 2003:3786, last page) and that of Harada et al. is August 17, 2003 (CAPLUS accession no. 2003:638087, last page) which can be antedated with a certified English translation for Japanese priority no. 2002-343822 having a date of November 27, 2002 as long as the subject matter contained therein supports the claimed limitations.

Ribera et al. has a publication date of October 28, 2002 (CAPLUS accession no. 2002:818689, penultimate page) which cannot be antedated by the Japanese priority application.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Earls et al., Hefner, Jr. et al., Barclay et al., Douglas et al., Ribera et al., Castell et al. and Harada et al. as applied to claims 1-4 hereinabove, and further in view of Japanese Patent Nos. 63-120725 and 21001-348488.

21. The primary references do not recite the thermally-conductive filler, although Earls et al. and Hefner, Jr. et al. establish the use of inorganic oxide fillers. Japanese '725 (abstracts) and '472 (abstracts and translation, page 5, paragraph 33) is directed to molded articles produced from epoxy resins including liquid crystalline epoxy resins (Japanese '472, page 2, paragraph 10) and thermally-conductive fillers such as  $\gamma$ -alumina (Japanese '725) or spherical cristobalite (Japanese '472).

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22. It would have been obvious to incorporate the  $\gamma$ -alumina of Japanese '725 or the spherical cristobalite of Japanese '472 as filler for Earls et al., Hefner, Jr. et al., Barclay et al., Douglas et al., Ribera et al., Castell et al. and Harada et al. in order to improve the thermal conductivity.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

23. Japanese Patent No. 2001-348488 is drawn to a biphenyl epoxy resin insulating layer (translation, page 4, paragraph 29) mixed with alumina, magnesium oxide, boron nitride, aluminum nitride or silica as an inorganic filler to impart excellent thermal conductivity (page 5, paragraph 36).

24. The CAPLUS accession no. 2004:353450 for Takezawa et al. teaches that increased thermal conductivity is a function of augmented mesogenic structure in epoxy resins.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Sellers whose telephone number is (571) 272-1093. The examiner can normally be reached on Monday to Friday from 9:30 to 6:00. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

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2/28/2006



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